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BULLETIN OF THE MASSACHUSETTS ARCHAEOLOGICAL SOCIETY



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EDITOR'S NOTES

Elizabeth A. Little

BULLETIN 53, no. 2, is distinguished by three timely papers that explore the way we do archaeology in the field, the way we draw inferences from stone tools in the lab, and the manner in which we present our findings to audiences. The motivation for these papers is not to collect things, but to draw meaning from what we have found and to pass our conclusions and our excitement on to our audiences. This is an important part of the science of archaeology.

Alan Leveillee and Suzanne Glover describe several paths that have been taken to try to locate a suspected 18th and 19th century Quaker graveyard, namely, documentary research, local informants, strategic arrays of survey testpits, and, finally, backhoe trenches in or near proposed building locations. Headstone fragments have turned up but no burials have yet been located. By the strategic survey, they were able to define for different sized cemeteries, the probability of missing all the burials. These are important studies for locating unmarked burials before the bulldozer does.

Peter Pagoulatos presents the results of a study of wear on edged tools of Attleboro Red Felsite used for working bone, wood, hide or plants. He also studied the edge alteration on these tools that resulted from manufacture and resharpening. Since several of these processes can produce similar effects on tool edges, he cautions archaeologists that edge alteration on Attleboro Red Felsite tools doesn't unambiguously indicate the kind of use or the

material worked.

Dena Dincauze has provided a brief and useful guide to how we (all) can improve our public presentations. As a result of trying to read too many unreadable 12-point typed transparencies through overhead projectors at meetings this spring, I readily accepted it for the *Bulletin*.

Bernard Otto has presented a photo of an unusual artifact with a brief description of its provenience. If you like it, please send me one of yours!

Three radiocarbon age reports appear in this issue. Your editor always welcomes additional C-14 reports for the *Bulletin*. Published C-14 ages seldom include the sometimes changing details reported by the testing laboratories. To publish a radiocarbon age in the *Bulletin*, simply send me a copy of the radiocarbon lab report, and a short description of the archaeological context (site name, town, MAS or MHC number, feature, depth, associated artifacts and your name). If you have any comments, such as, "This is not the age we expected," please add them. If you do not have a site number, send me a site location marked on a copy of a small section of a USGS topographic map, and I shall be able to provide you a number.

Finally, here's a five year index for the *Bulletin* put together by Sally Pendleton and me. We have tried to categorize items in a manner that will help make searches of the *Bulletin* logical, reasonably comprehensive and fun. Please let us know if we have neglected any of your favorite subjects.

AN ARCHAEOLOGICAL APPROACH TO A SUSPECTED 18TH AND 19TH CENTURY GRAVEYARD: INVESTIGATIONS ALONG THE NORTH RIVER, NORWELL, MASSACHUSETTS

Alan Leveillee and Suzanne Glover

Abstract: Prior to residential development along Norwell's North River, concerned local residents alerted authorities that the proposed house sites were planned within a known graveyard, the exact provenience of which was uncertain. Documentary research and limited archaeological investigations sponsored by the developer failed to pinpoint the location of the burial ground, but did provide sufficient evidence to suggest that a graveyard containing as many as 59 burials existed within or in close proximity to the 16 acre subdivision. The authors were charged with formulating a research design to test a hypothesis of human interment within a 2.1 acre section of the subdivision. The methodology, results and interpretations are discussed.

INTRODUCTION

Edward Wanton was a prosperous 17th century shipbuilder working his craft and residing along the North River in Norwell, Massachusetts. As history tells us, during his travels through the colony he witnessed the persecution of those practicing the Quaker faith and became a sympathizer, eventually converting to that faith. Mr. Wanton's 80 acres included his home, his shipyards and associated structures along the river, and the family graveyard which he opened to fellow Quakers.

By the 19th century the shipyard ceased to operate, the residence fell to abandonment, and

the graveyard became shrouded by the changing landscape. Today the Blackthorne Realty Trust includes 16 acres, once a part of the larger Wanton estate, within which a 2.1 acre tract is targeted for the construction of single family dwellings. Upon hearing of the development, local residents alerted authorities that the proposed house sites were planned within a reputed graveyard.

PREVIOUS RESEARCH

The initial search for the Wanton cemetery took place in 1985 when the project proponent commissioned a local historian, John Richardson, to investigate the area. Those investigations resulted in the identification of two, apparently in situ, headstone fragments and two additional subsurface fragments. The historian concluded that these remains, located within the proposed house sites construction area, constituted the Wanton graveyard (Holmes et al. 1989).

A second attempt to verify the location of the cemetery was commissioned in 1987. Under a permit issued by the Massachusetts State Archaeologist, a research team from the University of Massachusetts Archaeological Services (Holmes, Mulholland and Gumaer 1987) conducted documentary studies, informant interviews, a review of the 1985 investigations, synthesis of available mapping data, spatially concentrated resistivity testing, and limited subsurface excavations to test areas of anomalous electrical resistance. The in situ headstone areas, located in 1985, were also investigated by test trenches in an

attempt to identify grave shafts. The subsurface testing results were negative.

Based primarily upon documentary evidence, the University of Massachusetts study resulted in a conclusion that between 35 and 59 individuals could be located in the as-yet-unconfirmed graveyard (Holmes et al. 1989:38,110-113). The study went on to report that, based upon size descriptions, as many as 160 graves could exist within the bounds of the Wanton cemetery (Holmes et al. 1989:60).

Subsequent to the University of Massachusetts study, a descendant of Edward Wanton, and an advocate to protect the site from destruction, discovered a 1915 Harbor and Land Commission Map indicating what appears to be a marker labeled "Quaker". An evaluation of the mapping data by the University of Massachusetts research team indicated that the marker was located within the 2.1 acre house sites location.

OUR INVESTIGATIONS

In 1989 The Public Archaeology Laboratory, Inc., was commissioned to determine, beyond a reasonable doubt, if the Wanton graveyard was located within the 2.1 acre house sites project area. Our review of research to date indicated that, while no below-ground evidence of the graveyard had been found, alternate lines of evidence gave credence to the possibility that the cemetery did exist, or once existed, within the larger 80 acre property and perhaps within the 2.1 acre project parcel. We approached the problem of verifying the graveyard with three assumptions:

- 1- That, if the burials existed, they would be recognizable visually or texturally.
- 2- That burials would manifest themselves in anomalous soils in grave shafts, grave-related hardware, and/or skeletal remains.
- 3- That we could design and employ a strategy

with a high probability of locating one or more burials, if they existed.

We formulated a subsurface testing strategy based upon a working hypothesis that a graveyard consisting of more than 23 individual burials existed within the target survey area. The methodology and analyses employed were designed to test this primary working hypothesis with an adequate degree of statistical confidence. Furthermore, the methodology had to allow for the systematic collection of data that, while not related to the primary hypothesis, were potentially important to the regional archaeological record. It was not considered prudent, for example, to proceed immediately to machine strip the area for fear that prehistoric or other historic archaeological sites would be compromised in the process.

Two computer models and programs were employed when considering a testing approach. PROCAL (Lis and Kerber 1989) is a statistical evaluation determinator based on feature discovery probabilities and testing interval relationships as predicted by application of the Pythagorean Theorem. It has been formulated based upon data presented by Krakker et al. (1983) and Whalen's (1985) work regarding three dimensional site mapping design and evaluation of test pit sampling strategies. The PROCAL program considers three variables: feature diameter, grid interval, and test pit diameter. Given a hypothetical feature diameter and test pit diameter, the program can calculate the probability of discovery for any single feature of a given diameter with a given testing interval. It evaluates both staggered and square grid testing patterns.

The second computer application we relied upon was the PLACESTP and EVAL-STP program package developed by the University of Arizona (Kintigh 1987). PLACESTP allows the simulated systematic layout of test pits within a determined rectangular universe. It can be utilized to create a testing pattern that corresponds

to field conditions, which in our case is a rectangular area approximately 80 meters x 90 meters. EVALSTP allows for the random placement of any number of target features within a simulated testing universe. It performs a Monte Carlo statistical evaluation of the PLACESTP output data and determines the probability that the layout of test units would detect a feature with a given diameter.

PROCAL indicated that the predicted discovery of a 1.5 meter diameter feature would be doubled if a staggered, as opposed to square, grid was utilized. EVALSTP was used to randomly place as few as 23 and as many as 150 features within a staggered grid. Computer simulation indicated to us that 78 test pits, each measuring 0.5 x 1 meter, within a staggered grid pattern with a 7.5 meter interval across the site would result in the discovery of one or more burials, with a probability of 62% for a population of 23 burials, up to 92% for 59 burials and 99.8% for 150 burials (Table 1).

In the field a total of 84 test pits were dug, exceeding our computer model by 7%. Figure 1 illustrates our testing across the project area. When the hand excavations were completed a series of 21 machine trenches were dug with a backhoe to a depth of two meters. These were concentrated especially at the sites of proposed buildings and did not produce evidence for any burials.

RESULTS OF THE INVESTIGATION

Although the primary objective of the survey methodology was to locate suspected human burials, a substantial amount of archaeological data not directly related to testing the hypothesis was collected using the hand trenches and machine-assisted excavation units placed across the 2.1 acre parcel. This data included both prehistoric and historic assemblages.

Table 1. Probability, $(1-p(o))$, of discovery of one or more burials of diameter 1.5 m with a 7.5 m interval between testpits in a staggered array as determined by simulation.

n	E	$(1-p)^n = p(o)$	$1-p(o)$ (%)
23	0.865	0.38	62
34	1.325	0.24	76
40	1.79	0.19	81
50	2.155	0.12	88
59		0.08	92
75	3.085	0.04	96
100	4.145	0.02	98
150	6.18	0.002	99.8

n: number of simulated randomly placed burials;

E: average number of detected simulated burials;

p: estimated probability of detecting one randomly placed burial: total E/total n = 0.0415;

p(o): probability of finding no burials;

$1-p(o)$: probability of finding 1 or more burials from n randomly placed burials.

For this calculation we assume the overlap, if any, between randomly placed burials is small, which it should be since even 150 1.5m burials constitute only 4% of the site area.

Prehistoric Materials and Features. Eight hundred and eighty two pieces of prehistoric cultural material were recovered from within the project area. Of these 882 items, 869 were identified as lithic chipping debris that consisted predominately of quartz with lesser amounts of felsite, argillite, chalcedony, chert, and quartzite. Nine projectile points were recovered during the subsurface testing, as well as one point preform, two scrapers, and a single biface. Of these stone tool artifacts, one probable Neville point and four quartz Squibnocket triangle points were identified (Figure 2). These temporally diagnostic points suggest that this prehistoric site along the North

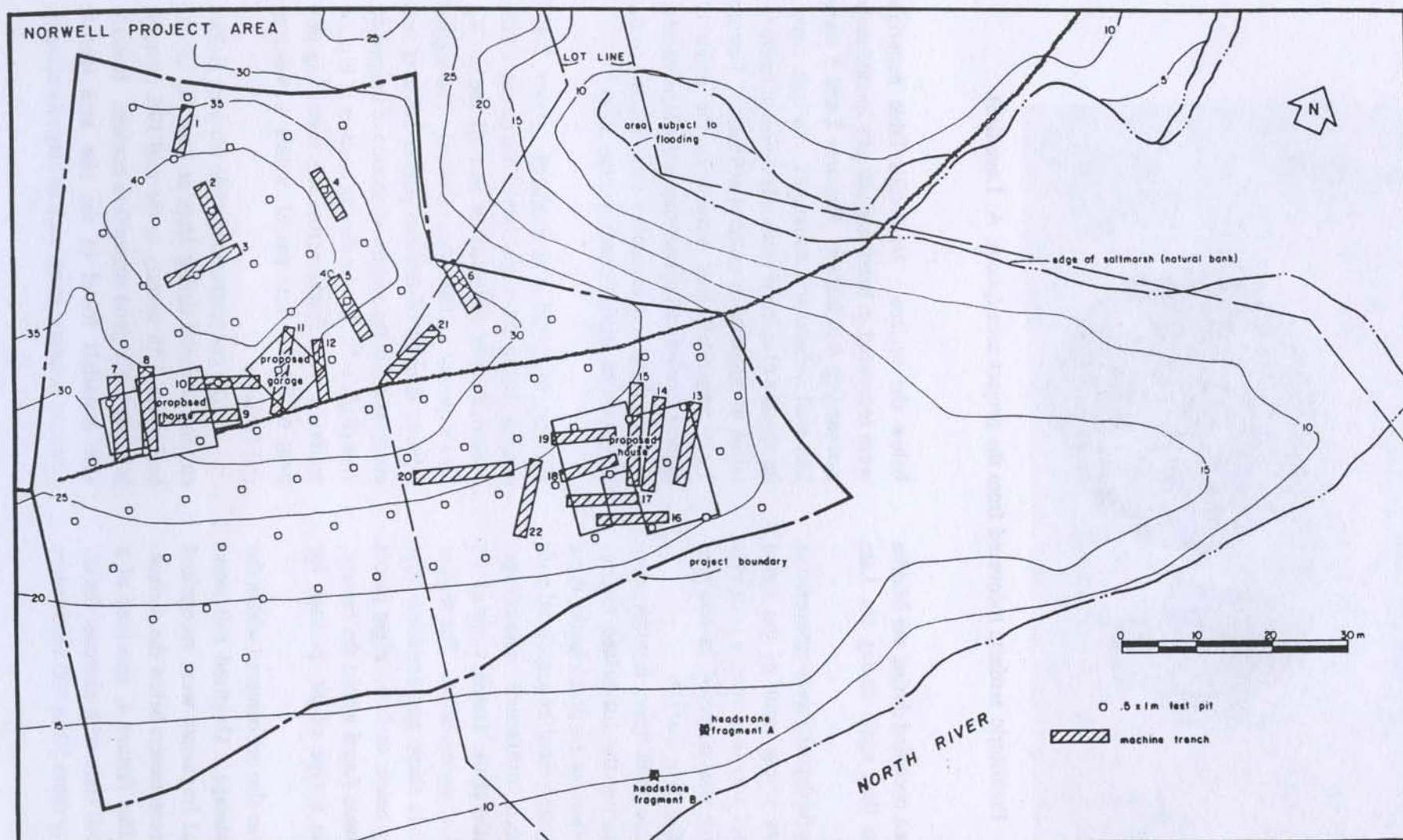


Figure 1. Subsurface testing strategy employed within the project area.

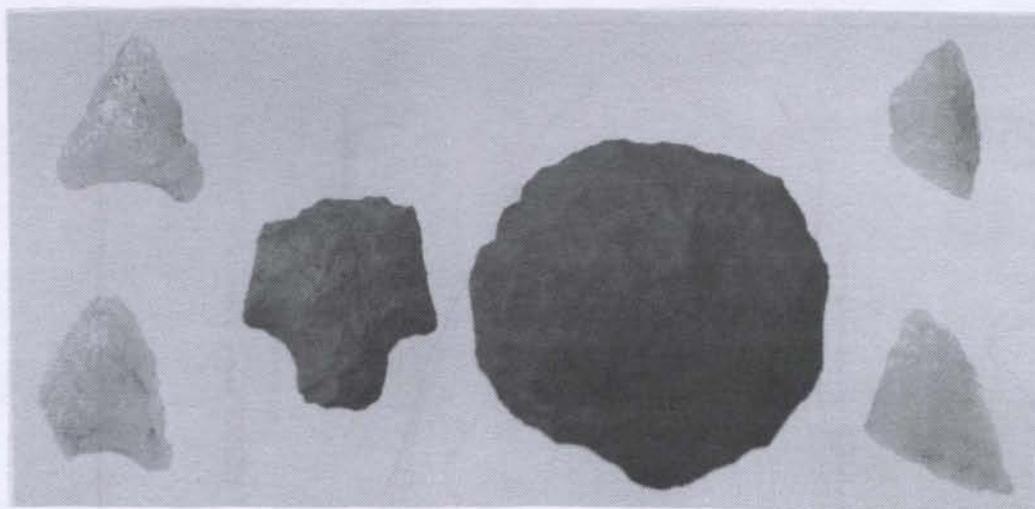


Figure 2. Prehistoric artifacts recovered from the project area (photo, A. Leveillee).

River may have been occupied during the Middle Archaic Period and then again during the Late Archaic Period.

The prehistoric deposits were recovered as low density scatters across most of the tested portion of the project area; however, a relatively higher concentration was observed in southern sections closest to the river margin.

Five probable prehistoric features were also encountered during the subsurface testing. While two of these features are problematic, three of them have been interpreted as associated with the above-referenced artifactual assemblage. Feature 1 was located at the eastern limit of the project within a lithic concentration. The feature appeared as conical in shape and extended from 22 to 90 centimeters below surface. Eight pieces of chipping debris were found within the feature, which functioned as a type of pit, perhaps for storage.

Feature 4 was also encountered within the concentration of debitage. Oxidized soil intermixed with charcoal fragments were recognized between 66 and 76 centimeters below the surface.

Feature 5, like feature 4, consisted of a circular, oxidized soil stain with charcoal flecks. It extended vertically from 50 to 100 centimeters

below the surface. Numerous lithic materials were recovered in hand dug test pits immediately surrounding this feature. Features 2 and 3 were less well defined soil anomalies. In both cases, an absence of cultural material prevented interpretation of temporal or cultural affiliation. Feature 2, in particular, may have been the result of natural depositional or post-depositional processes. Both of these soil anomalies were located to the northwest of artifact concentration areas.

Historic Materials and Features. Over 2,400 objects dating from the late 17th through 20th centuries were collected as part of the project area's historic archaeological record. The highest relative density of historic period artifacts was encountered in the southwest section of the project area (Figure 3). Lower density scatters of historic materials were found across the remaining portions of the 2.1 acre parcel, within a plowzone soil horizon.

The concentrated historic site area yielded cultural material dating from at least the second half of the 17th century to the mid 19th century, in a relatively good subsurface context. Identifiable materials found in the site area include common domestic items such as clay tobacco pipe

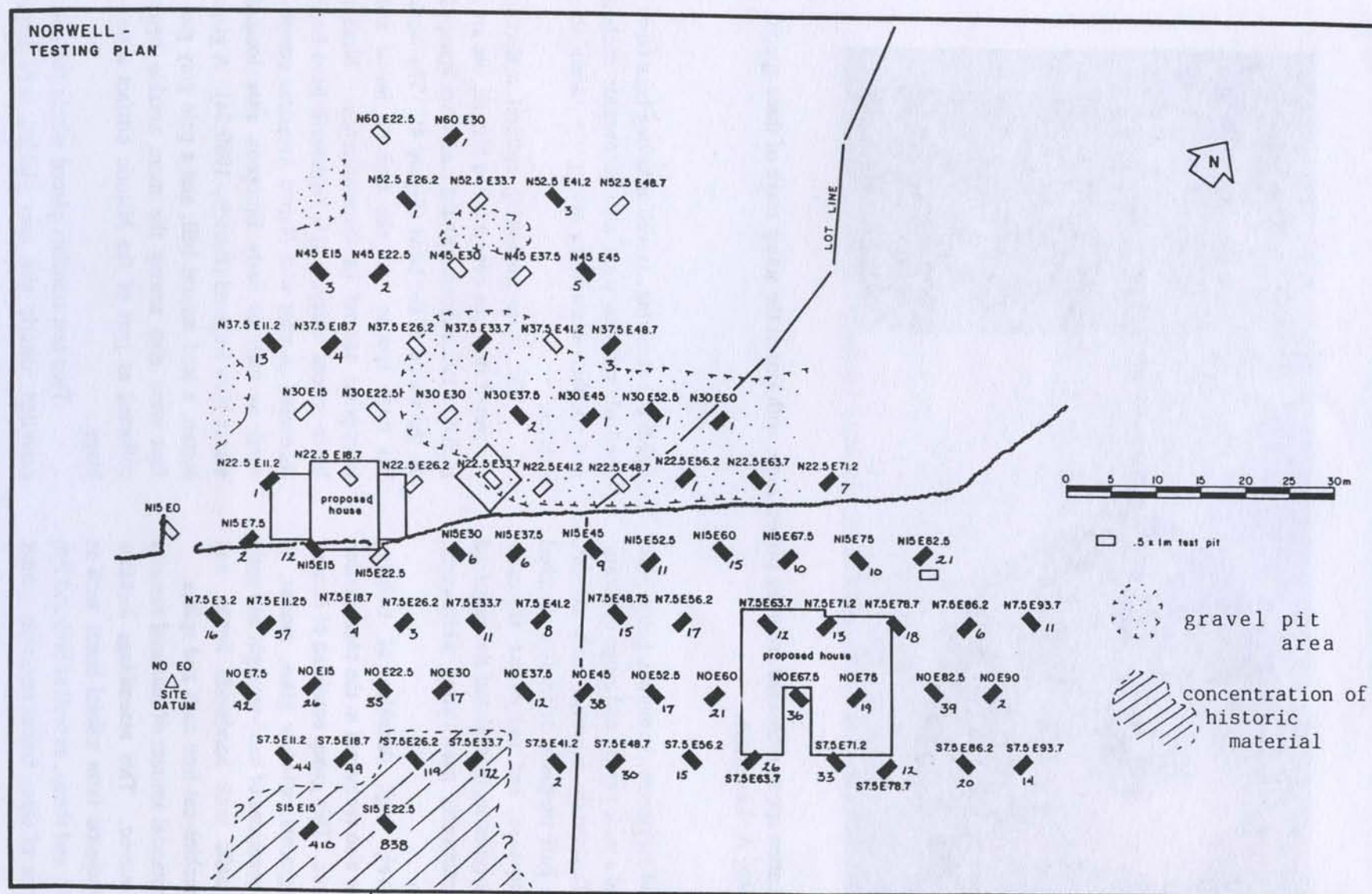


Figure 3. Results of subsurface testing within the project area.

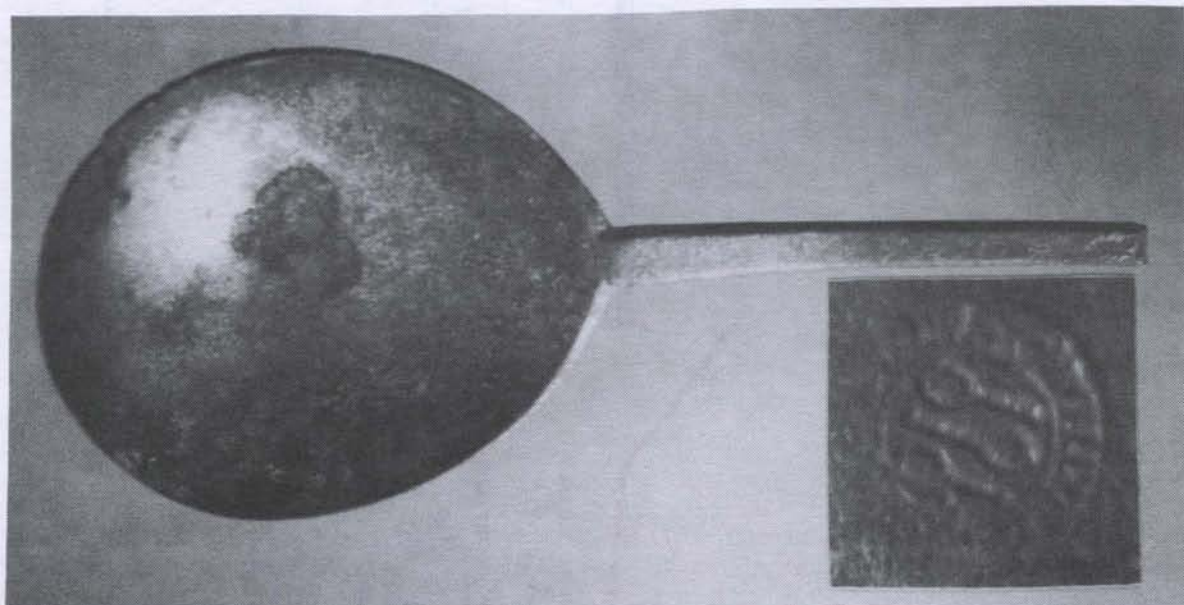


Figure 4. Latten spoon recovered from the project area, with (inset) the stamp mark of three spoons (photo, A. Leveillee).

stem and bowl fragments, numerous bottle glass fragments, and a wide variety and range of ceramic shards. Temporally sensitive early ceramic types include buff tin-glaze delftwares, combed and dotted slipware, and red coarse slipware. Later ceramic types include glazed and unglazed redwares, creamware, pearlwares, whitewares, and porcelain.

Relatively high densities of building materials were also recovered in the concentrated historic site area. This group consisted of numerous brick fragments, window glass, mortar, as well as large quantities of hand-wrought and early machine-cut nails with handmade heads, and completely machine-cut iron nails and spikes.

A substantial amount of mammal remains was also recovered. This assemblage includes identifiable domestic farm animal bones such as cow, pig, goat, and sheep, as well as bird and fish remains. Some of these faunal materials exhibit

traces of butchering, as well as having been burnt. Shellfish remains were also recovered; quahog and softshell clam were among the identifiable species.

The more interesting cultural materials recovered from the concentrated historic site area include a latten spoon with the trademark stamped on the inside of the bowl (Figure 4). The mark has three spoons with the maker's initial and inscription around its circumference. Similar latten spoons carrying this trademark have been recovered on sites with Native American components as well as early European sites located across New England (Beaudry 1980:74). A glass button, a lead musket ball, and a pale grey gunflint were also among the more notable items collected as part of the historic artifact assemblage.

Two test trenches placed within the concentrated historic site area yielded very large

quantities of cultural materials (1,248 of the total 2,460). These materials were recovered from a distinct soil stratum that extended from the ground surface to 50 centimeters below surface. The deposits appeared as very highly concentrated sheet refuse that accumulated horizontally as a result of repeated historic period occupations. These materials did not appear to have been deposited vertically in an intentionally excavated pit feature.

The large quantities and varied diversity of materials found within this recognizable historic soil stratum, which may reflect a series of historic period living surfaces, strongly suggests the presence of a nearby early historic homestead complex. Lesser quantities and densities of historic sheet refuse were found across the remaining tested portions of the project area. No significant concentrations were noted outside of the dwelling and shipyard area. The concentrated site area is interpreted as being an element of the late 17th and early 18th century Wanton homestead and shipyard complex. This historic domestic and commercial complex would have included the family dwelling, associated outbuildings, and the riverfront shipyard operation. According to one historian, the Wanton house "... stood near the bank of the river, on land afterward improved as part of the ship-yard" (Briggs 1889:215). The Wanton graveyard has been documented in the historic record as being situated "a few rods northeast" of the Wanton dwelling house (Deane 1831:372).

The knoll that dominates the western portion of the project was the object of sand and gravel extraction activities at the turn of the 20th century. Topsoils and subsoils had been removed to estimated depths of one meter or more. This area also appears to have served as a burial place for work or farm animals. Equine skeletal remains and an associated horseshoe were discovered at 75 centimeters below the surface in one of the hand trenches placed in the area immediately

surrounding the knoll. These skeletal remains were situated within a fine sand matrix. No visible or textural evidence of an associated burial shaft was observed during the hand excavation. Equine and bovine skeletal remains were also found during the excavation of machine trench #21, about 10 meters west of the first horse find. The animal remains were encountered at a depth of 80 centimeters below surface. A well-defined mixed organic topsoil and sandy subsoil matrix were recognizable above these animal bones.

One final artifact of note was found north of the concentrated dwelling and shipyard site area, adjacent to a remnant stone wall. It is a silver coin (Figure 5) which bears an inscription of King Charles III of Spain dated 1777. A Spanish coat of arms is on the reverse side. The coin was recovered from a plowzone horizon at a depth of 20 centimeters below the surface.

TESTING THE PRIMARY HYPOTHESIS

As a result of the subsurface investigations, 15 soil anomalies were recognized and identified during hand and machine assisted testing of the 2.1 acre parcel. Of these 15, five have been identified as of probable prehistoric origin. An additional four are the result of recent perctesting activity. Three soil anomalies were found to be associated with animal burials. All three animal burials were found within the relatively disturbed sandy knoll area. The remainder are attributed to natural processes.

No distinct features or soil anomalies that would indicate human interment or grave shaft fill were encountered during the subsurface testing. Nor were recognizable remains of coffins or associated hardware, or human skeletal remains found during the survey. Since our test procedures had a 92% or higher probability of finding at least one burial if there were 59 or more there, we can be reasonably confident that a cemetery of



Figure 5. 1777 coin recovered from the project area (photo, A. Leveillee).

that size or larger was not present on the 2.1 acre parcel.

CONCLUSIONS

Our recommendations to the sponsoring client for planning his housing development were based upon the results of testing the primary hypothesis as well as a consideration of additional classes of data collected (Leveillee 1989). These results, as outlined in this article, do not support the hypothesis that a graveyard containing 59 or more human burials is situated within the 2.1 acre project area. In addition, since no burials were found with 22 machine trenches within the sites of proposed buildings, the likelihood of finding burials in those sites is further reduced.

However, the concentrated area of historic cultural deposits identified in the southwest portion of the project area appears to represent a contributing archaeological element of a significant 17th through 19th century historic domestic and industrial site. If these archaeological deposits

are associated with the Wanton dwelling and shipyard complex, then additional archaeological investigations could possibly lead to locating the associated graveyard.

Although our investigations did not locate any archaeological evidence to support the presence of a cemetery within the 2.1 acre parcel, the approach we used to investigate the project area did succeed in identifying a potentially significant area of historic occupation, which is considered contemporaneous with the as-yet-undiscovered graveyard, and may prove to be the key to pinpointing its whereabouts within the original 80 acre Wanton estate. A prehistoric site, though of relatively low density and not of potential significance, was also successfully identified by the testing strategy.

While documentary research collectively suggests that numerous burials can be expected to exist within the Wanton cemetery, it should be noted that some references (i.e. Briggs 1889:215) report "several" graves, suggesting fewer than the 23+ addressed by our methodology. The utiliza-

tion of machine assisted trenches in specific building areas provided additional confidence to our approach and to an extent addressed that concern. We recommend that future attempts to locate the Wanton graveyard re-examine available documentation in an effort to more firmly establish the likely number of burials there.

Acknowledgments: We gratefully acknowledge the work of researchers who preceded us along the banks of the North River. These include Mr. John Richardson and Ms. Sally Sanford. Thanks also to the archaeological and historical research team from the University of Massachusetts at Amherst.

We also appreciate the efforts of the field excavation crew from The Public Archaeology Laboratory, Inc., which included Beth Miller, Christy Vogt, Ron Dalton, David Forminack, Bill Begly, and Karen Michalec. Thanks also to Imogene Lim who produced cartographic figures in the text. We would also like to acknowledge Betty Little for her editorial comments and her statistical advice. Brona Simon provided important guidance through the course of our investigations. While any shortcomings in this article are the responsibility of the authors, its strengths are, in good part, the result of the talents of those listed above.

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RADIOCARBON AGE REPORTS (see Little, 1988 BMAS 49:1)

Tobey Site, Rehoboth, MAS # M39-SW-105

Sample: charcoal (#I4-20-2A) from 28 cm below surface, Section A, Feature 16, a stone-lined hearth which also contained two Stark points. Sample age: $3,630 \pm 70$ (Beta-27935) in radiocarbon years before 1950 ± 1 sigma. No $\delta^{13}\text{C}$ correction. Errors of modern standard, background and sample. ^{14}C half-life: 5568 years; 95% Oxalic Acid standard. (Peter Pagoulatos, Cohannet Chapter, 1988 Annual Report; Beta Analytic Report 1988).

Tobey Site, Rehoboth, MAS # M39-SW-105

Sample: charcoal (#C5-14-63A) from 146 cm below the surface in Section A, Feature 7, a large pit 2 m deep and over 4 m in diameter, containing a large quantity of fire-cracked rock. Sample age: $4,710 \pm 60$ (Beta-27934) in radiocarbon years before 1950 ± 1 sigma. No $\delta^{13}\text{C}$ correction. Errors of modern standard, background and sample. ^{14}C half-life: 5568 years; 95% Oxalic Acid standard. (Peter Pagoulatos, Cohannet Chapter, 1988 Annual Report; Beta Analytic Report 1988).

Pagos Site, Brewster, MHC #19-BN-658

Sample: wood charcoal fragments from occupation horizon in Excavation Unit #3 (EU3), 20-30 cm in depth below surface. Sample associated with pottery and flakes. Conventional age of sample: 2435 ± 160 B.P. (GX-16799) in radiocarbon years before 1950 ± 1 sigma, ^{13}C corrected. $\delta^{13}\text{C} = -25.9$ o/oo. Error is judged by the analytical data alone. ^{14}C half-life: 5570 years; 95% NBS Oxalic Acid Standard. (Alan Strauss, Eckblaw Chapter, MAS Matching Funds Application; Geochron Report 1991; "Additional Archaeological Investigations at the Pagos Houselot in Brewster, MA," 1991, on file at Massachusetts Historical Commission).

EDGE ALTERATION STUDY FOR ATTLEBORO RED FELSITE TOOLS

Peter Pagoulatos

INTRODUCTION

The primary purpose of this paper is to present the results of a series of experiments using Attleboro red felsite tools to establish the relationship between specific usewear damages and cultural activities. In the first study, stone tool alteration (i.e. usewear damage) was assessed through controlled experiments in which the raw material Attleboro red felsite was used on specific types of materials: plant, hide, wood, and bone, according to certain types of motions or actions and different amounts of use. Artifacts were subsequently analyzed for observable usewear damage characteristics. The second study concerns the observable edge alteration of Attleboro red felsite bifaces and flakes after manufacture, use and resharpening. Edge damage produced by all these processes is described and analyzed.

Studies in ethnoarchaeology and experimental archaeology have contributed significantly to archaeological method and theory (Hayden 1979b; Ingersoll, Yellen, and MacDonald 1977; Binford 1978; Odell 1980; Gould 1980; Keeley 1980). Felsite was one of the raw material resources most widely used by prehistoric Native American populations in southern New England (Dincauze 1974, 1977; Anthony, Carty, and Towle 1980; Thorbahn 1982; Ritchie 1983). However, the functions of artifacts made of locally derived felsite in Massachusetts are still poorly understood (Barber 1981; Callahan 1979; Dincauze 1976; Pagoulatos 1986; Strauss 1986; Ritchie 1983). Until recently, the interpretation of felsite tool function from prehistoric sites in

this region was largely based upon ethnographic analogy or comparative usewear studies of flints from other areas (Bordaz 1969; Collins 1975; Cotterell and Kamminga 1987; Crabtree 1969, 1972; Bamforth 1986; Binford 1978, 1979, 1980; Ericson and Purdy 1984; Hayden 1979a; Kamminga 1979; Keeley 1977, 1980; Keeley and Toth 1981; Newcomer 1971; Odell 1977; Odell and Odell-Vereecken 1980; Semonov 1964; Speth 1972, 1975; Shafer 1970; Sheets 1973; Swanson 1975; Torrence 1983; Tringham et. al. 1974).

With these problems in mind, a series of controlled experiments were conducted to assess whether felsite would produce differential patterns of edge damage, dependent upon specific motions and amounts of use, use on different materials, and manufacture, use and resharpening. In turn, the producing of specific use characteristics under experimentally controlled conditions would aid in archaeological interpretation, and allow for the development of hypotheses that could be tested against the archaeological record in Massachusetts.

Resource Collection. Attleboro red felsite is a coarse-grained igneous rock. Several felsite source areas are known to exist in Massachusetts, including those of the Boston Basin (Blue Hills igneous, Mattapan volcanic complexes) and the Lynn volcanic series on the North Shore (La Forge 1932; Chute 1940, 1966; Ritchie 1983). The felsite material used in this study, Attleboro red felsite (Strauss and Murray 1988), a very dark reddish-brown (10 Y 3/2) stone, was surface collected from the general vicinity of an outcrop in South Attleboro, Massachusetts.

1. USE-WEAR STUDY

Usewear damage is defined as the observable manifestation of the reduction wear of an edge from manufacture or use. Materials of different hardnesses are generally divided into three categories: soft, medium, and hard. The working of soft materials such as plant items is believed to produce polish usewear damage (Whitthoft 1967; Ahler 1979; Lawrence 1979; Kamminga 1979). The working of medium-hardness materials such as hide and wood is believed to result in feathering and smoothing usewear damage (Hayden 1979b; Kamminga 1979; Odell and Odell-Vereecken 1980). The working of hard material such as bone and stone is believed to result in usewear damage such as stepped chipping and crushing (Odell 1977; Lawrence 1979; Odell and Odell-Vereecken 1980; Keeley 1980).

A total of 24 usewear experiments were conducted on Attleboro red felsite over a one-week period in February of 1991, with four types of material: plant (corn), hide (white-tailed deer), wood (oak), and bone (white-tailed deer). Subsequent to the controlled experiments, each felsite artifact was analyzed for observable usewear damage in relation to motion and amount of use.

Laboratory Methods. Felsite was initially reduced with a hammerstone. Each artifact or flake was used in a particular motion or action for a specific number of times, against a designated material. Motions consisted of cutting and scraping, with all movements perpendicular to the user. The former was bidirectional; the completed motion consisted of cutting movements both away and back toward the user. The latter was unidirectional, consisting of a scraping movement only away from the user. The completion of each designated cutting and scraping motion counted as one stroke. Amounts of use ranged from 100, 500, to 1000 strokes.

Limited use consisted of 100 strokes. Moderate and high uses consisted of 500 and 1000 strokes, respectively. Once each experiment was completed, certain information was recorded, such as whether an artifact exhibited observable edge damage or adhering residue of the worked material.

Analytical Methods. Artifacts were examined using a low-power (10-30x) stereoscopic microscope, and any observable usewear damage and material residue were recorded. Attributes such as the location, orientation, plan, angle, and continuity of wear were recorded on standardized code sheets. Artifacts were subsequently photographed using a 10x magnified 35 mm camera attachment.

Analysis. Data were compared using simple quantitative measures such as frequencies and percentages, to assess whether patterns existed. The 24 felsite artifacts (Figure 1) were analyzed in terms of usewear damage, type of motion, and amount of use, in relation to material. The results from each experiment are presented in Table 1 and discussed below.

Felsite Resource Use: A total of 11 artifacts (46%) had observable edge damage; 92% yielded residual matter (Table 1, Figures 1-3). A rather wide range of usewear types was identified, including crushing, stepped chipping and polish. All (100%) artifacts used on bone and 83% of those used on wood resulted in edge damage (Table 1). No observable edge damage was noted on artifacts that were used on plants and hides.

Use motion: Cutting activities resulted in unifacial and bifacial edgewear; scraping was exclusively characterized by unifacial edge damage (Table 2). Both motions resulted in low to medium angles of wear (Table 3). Damage attributed

Table 1. Lithic Analysis Results

Sample number	Material type	Use motion	Amount of use	Contact material	Observable usewear type	Location of wear	Plan of wear	Orientation of wear	Angle of wear	Continuity of wear	Observable residue
01	felsite	cutting	100x	plant	none						present
02	felsite	scrapping	100x	plant	none						present
03	felsite	cutting	100x	hide	none						present
04	felsite	scrapping	100x	hide	none						present
05	felsite	cutting	100x	wood	none						present
06	felsite	scrapping	100x	wood	crushed	unifacial	sinuous	indeterminate	low	discontinuous	present
07	felsite	cutting	100x	bone	stepped/crushed	unifacial	straight	perpendicular	low	continuous	present
08	felsite	scrapping	100x	bone	stepped/crushed	unifacial	concave	mixed	low	continuous	present
09	felsite	cutting	500x	plant	none						present
10	felsite	scrapping	500x	plant	none						present
11	felsite	cutting	500x	hide	none						none
12	felsite	scrapping	500x	hide	none						none
13	felsite	cutting	500x	wood	polish/crushed	bifacial	sinuous	indeterminate	medium	continuous	present
14	felsite	scrapping	500x	wood	stepped/crushed	unifacial	sinuous	perpendicular	medium	continuous	present
15	felsite	cutting	500x	bone	crushed	unifacial	straight	indeterminate	medium	continuous	present
16	felsite	scrapping	500x	bone	crushed	unifacial	sinuous	indeterminate	medium	continuous	present
17	felsite	cutting	1000x	plant	none						present
18	felsite	scrapping	1000x	plant	none						present
19	felsite	cutting	1000x	hide	none						present
20	felsite	scrapping	1000x	hide	none						present
21	felsite	cutting	1000x	wood	polish/crushed	bifacial	sinuous	indeterminate	medium	continuous	present
22	felsite	scrapping	1000x	wood	stepped/crushed	unifacial	sinuous	perpendicular	low	continuous	present
23	felsite	cutting	1000x	bone	crushed	bifacial	straight	indeterminate	low	continuous	present
24	felsite	scrapping	1000x	bone	crushed	unifacial	sinuous	indeterminate	medium	discontinuous	present

to cutting was continuous, with sinuous and straight edges; scraping generally produced continuous wear, with concave and sinuous edges (Table 4-5). Identifiable orientation of wear was perpendicular (Table 6).

Usewear damage: A variety of usewear damage types were found on felsite; crushing was observed for 100%, stepped chipping for 36% and polish for 19% of the edge damaged artifacts (Table 1). Polish was only found on artifacts used for cutting wood.

Amount of use: Moderate and high amounts of use were more likely than limited use to yield edge damage. A total of 50% of those artifacts used for moderate and high numbers of strokes had usewear; only 38% had edge damage when

worked for limited numbers of strokes (Table 1). Of those artifacts used for moderate and high numbers of strokes, all had edge damage when worked on wood and bone; 75% exhibited usewear damage when working wood and bone for limited numbers of strokes (Table 1). Artifacts used on plants and hides did not yield any observable edge damage, regardless of amount of use.

Conclusions: An experimental study of Attleboro red felsite usewear has been presented. The study was concerned with the identification of edge alteration characteristics such as usewear damage in relation to motion of use, amount of use and worked material. The working of felsite resulted in a moderate degree of observable use alteration. Nearly half of the artifacts had usewear damage; the vast majority had observable residual matter.



Figure 1. The 24 Attleboro red felsite artifacts used in Usewear Experiments.



Figure 2. Magnified usewear damage of felsite artifact, sample No. 16, worked on bone.



Figure 3. Magnified usewear damage of felsite artifact, sample no. 23, worked on bone.

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Tables 2-6: Use Motion and Use Wear for Attleboro Red Felsite.

Table 2. Use motion and location of wear.

Motion	UNF	BIF	EDG
Cutting	2	3	0
Scraping	6	0	0

Table 3. Use motion and angle of wear.

Motion	LOW	MED	HIGH
Cutting	2	3	0
Scraping	3	3	0

Table 4. Use motion and continuity of wear.

Motion	CONTIN	DISCONTIN
Cutting	5	0
Scraping	4	2

Table 5. Use motion and plan of wear.

Motion	CVX	CCV	SINU	STR
Cutting	0	0	3	2
Scraping	0	1	5	0

Table 6. Use motion and orientation of wear.

Motion	INDET	PERP	MIX	OBLQ
Cutting	4	1	0	0
Scraping	3	2	1	0

Key for abbreviations:

Location of wear

UNF = unifacial
BIF = bifacial
EDG = edge

Plan of wear

CVX = convex
CCV = concave
SINU = sinuous
STR = straight

Orientation of wear

INDET = indeterminate
PERP = perpendicular
MIX = mixing
OBLQ = oblique

Continuity of wear

CONTIN = continuous
DISCONTIN = discontinuous

Felsite yielded few patterns attributed to specific actions; cutting generally produced bifacial wear and scraping resulted in unifacial edge damage; edge wear was usually continuous.

Usewear damage on felsite consisted of polish, stepped chipping, and crushing. However, 100% of the edge-damaged artifacts exhibited crushing. Polish was most often found on artifacts used for cutting wood. Felsite artifacts worked on plants and hides did not produce observable edge damage. Artifacts were more likely to yield observable edge damage when worked for a moderate and high amount, and less likely to result in damage when worked for a limited amount, but edge damage became apparent on felsite during early stages of use.

2. MANUFACTURING, USE AND RESHARPENING STUDY

Laboratory Methods.

Manufacturing: Attleboro red felsite was initially reduced, using percussion flaking techniques, with a quartz hammerstone; the completed biface had a 30 degree edge angle. The biface was then examined for any observable edge damage. Subsequently, twenty-five flakes (byproducts) were randomly selected from the manufacturing experiment; flakes generally ranged from five to ten millimeters in size (biface fragments which snapped off during the manufacturing process were not included in this study). Each flake was then examined for any observable anomalies (e.g., edge alterations).

Use: The Attleboro red felsite biface was then worked on fresh wood (oak) in a bidirectional manner; the completed motion, or stroke, consisted of a cutting movement both away from and back toward the user. Amount of use was 500

strokes for the biface. After the completion of the use process, the artifact was examined for observable edge damage. Edge alteration attributed to manufacture and use was primarily in the form of crushing similar to that reported by Odell (Odell 1977; Odell and Odell-Vereecken 1980).

Resharpener: Subsequently, the biface was resharpened to rejuvenate its edge, employing the same hammerstone. Once the biface was resharpened, it was again examined for observable edge damage. Ten flakes (by-products) were then randomly selected from the resharpening experiment; flakes generally ranged from five to ten millimeters in size (biface fragments which snapped off during the resharpening process were not included in this analysis). Each flake by-product was then examined for any observable anomalies (e.g., edge alterations).

Analytical Methods. All artifacts from these experiments were examined using a low-power (10-30x) stereoscopic microscope, recording observable edge damage attributes. Artifacts were subsequently photographed using a 10x magnified 35 mm camera attachment.

Analysis. Once the experiments were completed, the data were compared using simple quantitative measures such as frequencies and percentages. Each artifact was analyzed in terms of edge damage in relation to biface manufacture, use and resharpening.

Manufacture: Felsite biface manufacture produced flake scars and crushed edge damage (Figure 4). Flake scars extended about 10 mm from the edge of the tool; observable edge damage extended 1-2 mm from the edge. A total of twelve flakes (48%) showed observable damage, primarily in the form of crushing (Figure 5).



Figure 4. Manufactured felsite biface with magnified edge damage (10x).

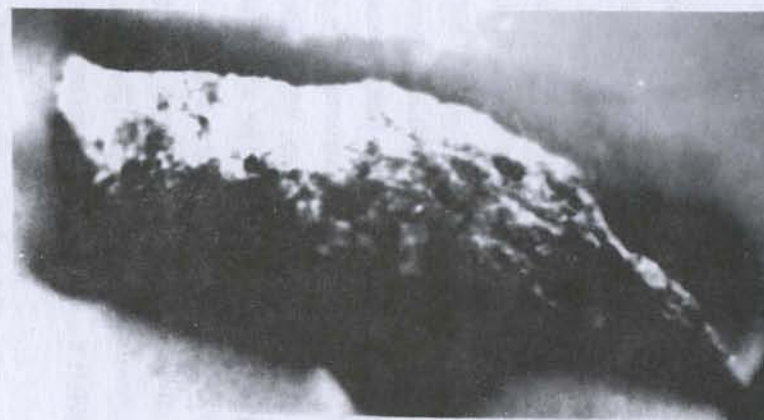


Figure 5. Felsite biface reduction flake with magnified crushed edge damage (10x).

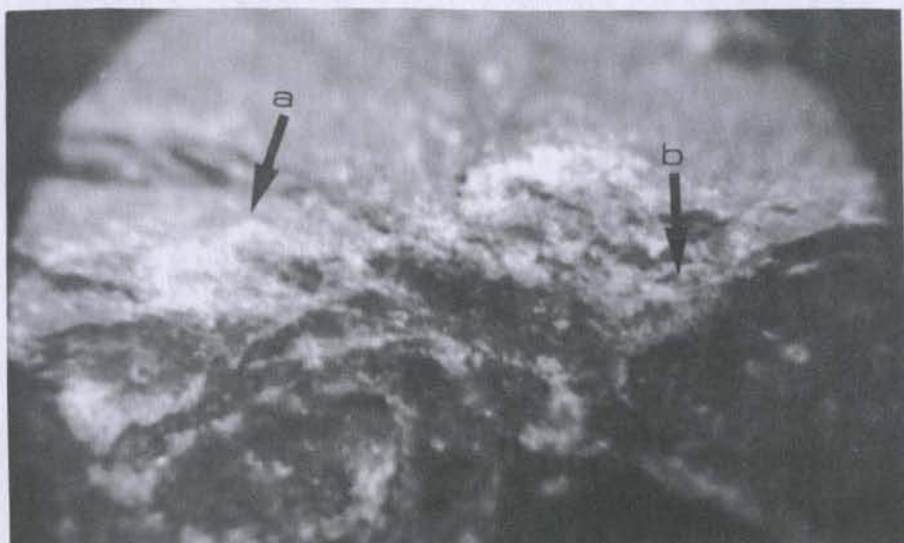


Figure 6. Resharpened felsite biface with magnified crushed and polished edge damage, a) crushed usewear, b) polished usewear (10x).

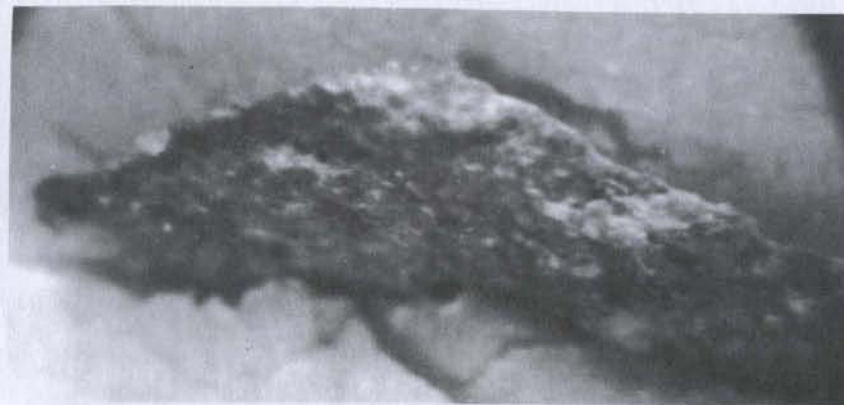


Figure 7. Felsite biface reduction flake with magnified crushed edge damage (10x).

Use and Resharpening: Felsite biface resharpening also produced flake scars and edge damage. Edge damage primarily consisted of crushing, although a small amount of polish was also encountered (Figure 6). Flake scars extended about 10 mm from the edge of the tool; observable crushing edge damage extended 1-2 mm from the edge. A total of five flakes (50%) had observable damage in the form of crushing (Figure 7).

Conclusions: Felsite was one of the raw materials most widely used by prehistoric Native American populations in southern New England (Dincauze 1974, 1977; Anthony, Carty and Towle 1980; Thorbahn 1982; Ritchie 1983). However, until this study, little was known about felsite tools. The current data suggest that observable edge alteration on bifaces and associated flake debris did result from manufacture, use and resharpening.

As a cautionary note, it was almost impossible to distinguish between crushed edge damage produced by biface manufacturing, use and resharpening and that produced by working hard items such as bone and wood for extended periods of time. Therefore, edge-altered formed tools and associated flake debris in archaeological contexts could be misidentified as possible tool manufacturing, woodworking, butchering, or tool resharpening work areas.

SUGGESTIONS FOR FUTURE RESEARCH

Further research should include an evaluation of the residue materials which adhere to stone. The majority of artifacts in the use-wear study yielded evidence for observable residue. Particular compositions of residues on stones can be identified as to specific plant and animal species. Analytical approaches have been used in the identification of fats, oils, hair, and blood

residues on stone tools (Shafer and Holloway 1979; Loy 1983). Other avenues of investigation should include the use of additional types of worked materials (i.e., fish, meat, shell, stone) and motions (i.e., boring, crushing) on quartzite. These variables may result in differential types of edge damage. Previous research on flints has attempted to address some of these issues (Tingham et. al., 1974; Keeley 1980; Odell and Odell-Vereecken 1980). Carefully controlled studies should be initiated using pressure flaking techniques and different percussion instruments (e.g., wood, stone) of different hardnesses, which could result in very different edge damage manifestations (see Crabtree 1969). Other avenues of investigation might include an analysis of edge damaged Attleboro red felsite under higher levels of magnification (i.e., scanning electron microscopy).

Finally, the experimental analysis of Attleboro red felsite should allow for the development of testable hypotheses that will contribute to the interpretation of the archaeological record. This methodology, in conjunction with other avenues of inquiry, will enable archaeologists to better evaluate prehistoric assemblages of felsite found in Massachusetts and southern New England.

Acknowledgements. I wish to thank the Cultural Resource Consulting Group for making this project possible, as well as Thomas Lux, Pierre Morenon, Charles Bello, and Kristian Eshelman for their assistance. I would especially like to thank Kevin McBride for his previous assistance in the development of this lithic analysis methodology. Any inaccuracies in this paper are the sole responsibility of the author.

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AN UNUSUAL SLATE ARTIFACT FROM THE POWELL SITE KINGSTON, MASSACHUSETTS

Bernard Otto

This ground slate artifact bears some resemblance to a fish or seal. The bottom part has been ground to an edge and exhibits five serrations or notches and two larger notches. The obverse side (upper photo) has a round pecked depression with incised lines radiating outward. On the left are parallel vertical incised lines bounded by an incised line at the top. The reverse side (lower photo) has a vertical channel that has several fine lines angling across it. The horizontal groove may have been used to sharpen bone needles, bone fish hooks, or bone tools. It

is also possible that the serrated edge was used to scale fish. Are we looking at a fishing accessory?

This artifact was recovered from the Powell Site (19-PL-584) at the junction of loam and subsoil, adjacent to and approximately at the same depth as the top opening of a firepit containing charcoal, firestone and scattered felsite and quartz chips. Radiocarbon dating of a sample of charcoal from the pit by Geochron Laboratories (GX-14167) gave its age as 4175 ± 145 ^{14}C years B. P., $\delta^{13}\text{C}$ corrected, which would place it within the Late Archaic Period (BMAS 51:68).

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ON SPEAKING TO AN AUDIENCE

Dena F. Dincauze

No one is born knowing how to present information orally to groups of people, whether those people are friends or strangers. Fortunately, the methods for effective oral presentations are not secret, nor are they difficult to master. Remarkably, they are far too often ignored. In the interest of better meetings and fuller communication, I submit the following notes for the attention of organizers of sessions and presenters of papers at public meetings of all kinds.

The first rule of good presentations is to know your audience - different groups deserve different approaches, and the approaches must be defined at the start of preparation. Prepare for and speak to the audience you have, not the one you desire. For example, an audience of avocational archaeologists can be expected to know much of the methodological and technical language of archaeology, but not the most recent theoretical concerns and innovations. Reach them where they are, without talking down or unrealistically assuming expertise. A mixed audience of avocationalists and professionals should be an appropriate audience with whom to discuss some theory, as long as you provide basic explanations to permit them to follow your lead. An audience of interested laypersons or children should not be expected to follow or to be deeply interested in discussions of theoretical or even methodological minutiae. You can best reach such audiences by presenting dramatic situations, novelties, and narrative reconstructions. Assume no background and provide whatever is needed for them to follow you.

One of the cardinal rules of good commu-

nication is to observe scrupulously the time limits defined for your talk. Ask the organizer or chairperson for guidance on duration if none is provided. You have an unspoken compact with the audience to be timely, and they will hold you to it by withholding their attention if you go on too long. In general, people can pay close attention comfortably for about 20 minutes. This span reflects real physiological and intellectual limits. Do not exceed those limits unless the longer duration is clearly established in advance. For longer papers, try to speak in segments of 20 minutes or less, breaking up the continuity of your voice with summaries, change of pace or tone, or visual materials. Even in short papers, it is good to introduce some redundancy by recapitulating your main points as you complete a section of argument.

Understand that the experience of hearing an oral presentation is different from reading a printed text; therefore, your text should be prepared differently for hearing or reading. For oral delivery, speak in short, grammatically simple sentences in narrative mode. Do not read technical materials, equations, statistics, or tables. If you cannot avoid including such data, prepare graphics that can be projected, so that the audience can read them, not try to hear them. Clear, snappy, interesting projected graphics are better than handouts, although the truly involved audience members will appreciate handouts being available at the end of the talk. Spoken presentations are best comprehended when they deal with actions, arguments (not complex ones), and conclusions. Give your audience some quotable, packaged ideas to take away.

Practice your presentation beforehand. Study effective orators as occasion permits; emulate their best strategies. Do dramatic readings, with friends when possible, so that you can learn to escape vocal monotone and add rhythm to spoken sentences. As you practice, polish any sentences that give you trouble reading aloud. Excise all tongue-twisters. Be certain of pronunciations of all words. Time your presentation closely, and cut if necessary to be comfortably within the time limit without rushing. Only that

way can you assure that you will have your last word.

Many other hints for effective preparation and delivery may be found in *American Antiquity* vol. 49(1), pages 154-161, where Karen Olsen Bruhns discusses most of the typical problems of speakers and provides readily available solutions.

Master these simple techniques and you can be confident that at your next podium appointment you will dazzle your audience.

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